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A5R RPG

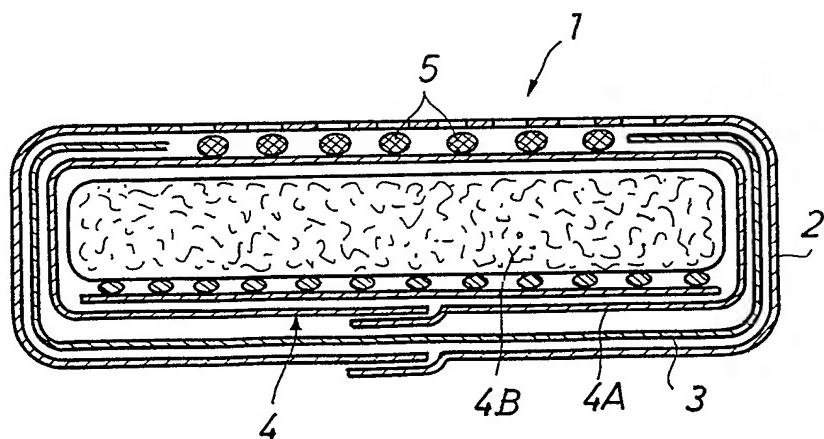
(56) Documents cited  
GB 2167666 A EP 0192265 A2 US 4069822 A

(58) Field of search  
UK CL (Edition K) A5R RPC RPG RPL  
INT CL<sup>5</sup> A61F 13/15 13/46 13/48 13/50 13/52  
Online databases: WPI

## (54) Absorbent article

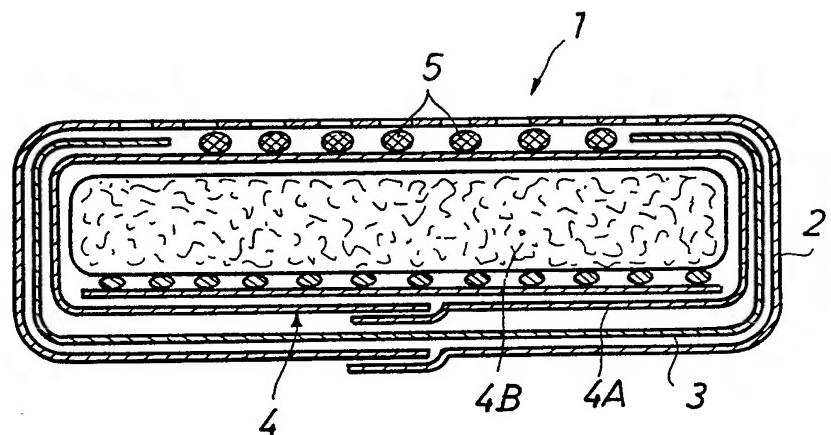
(57) An absorbent article (1) comprises a liquid-permeable inner sheet (2), a liquid-impermeable outer sheet (3) and an absorbent element (4) interposed between them. The outer sheet (2) is partially adhered to the absorbent element (4) by means of an adhesive (5) which occupies 70% or less of the area of the inner sheet (2) and has a 180° peel adhesion measured in accordance with the method of JIS C 2107 of 4000 g or less.

## FIG. 1



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F I G. 1



F I G. 2

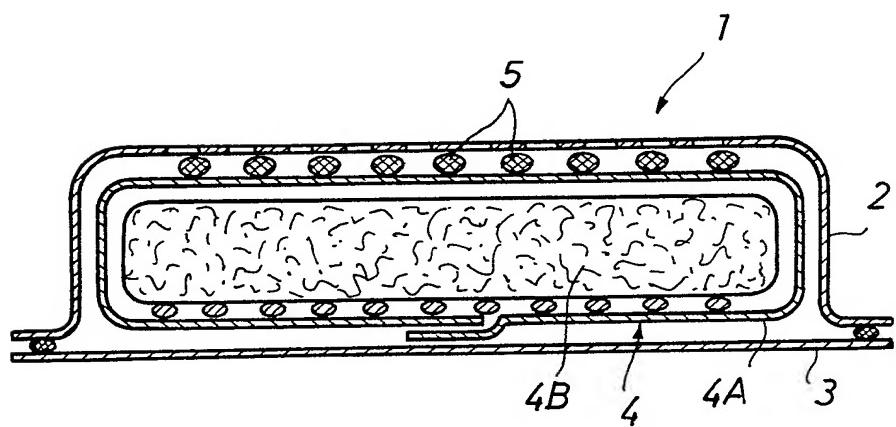


FIG.3

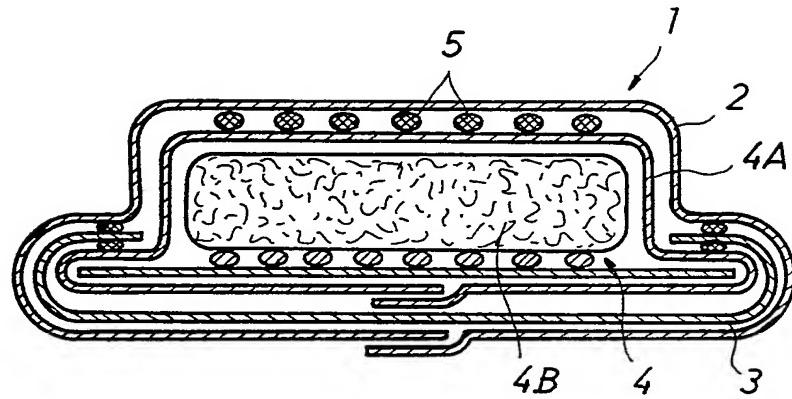
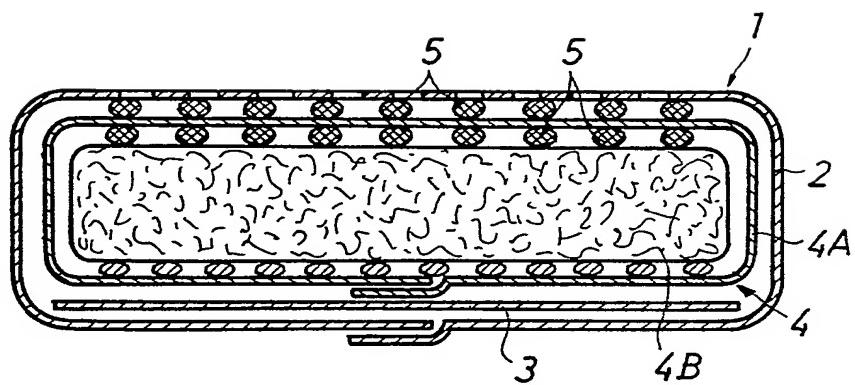
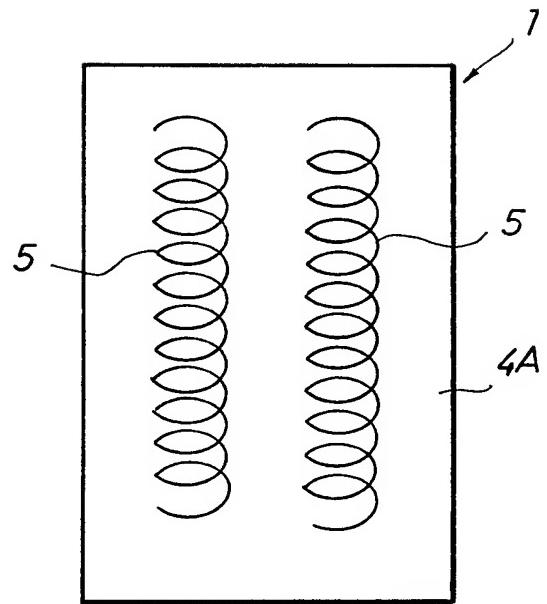


FIG.4



**F I G.5**



**F I G.6**

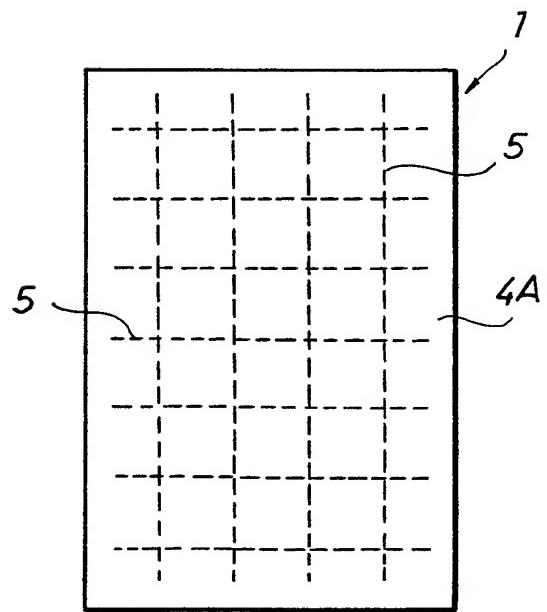


FIG.7

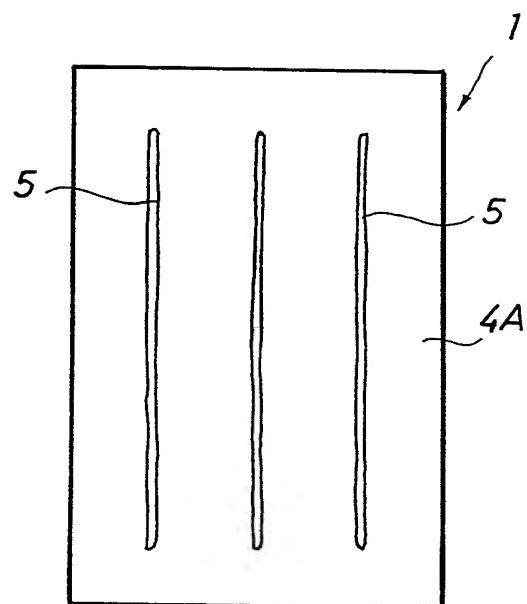
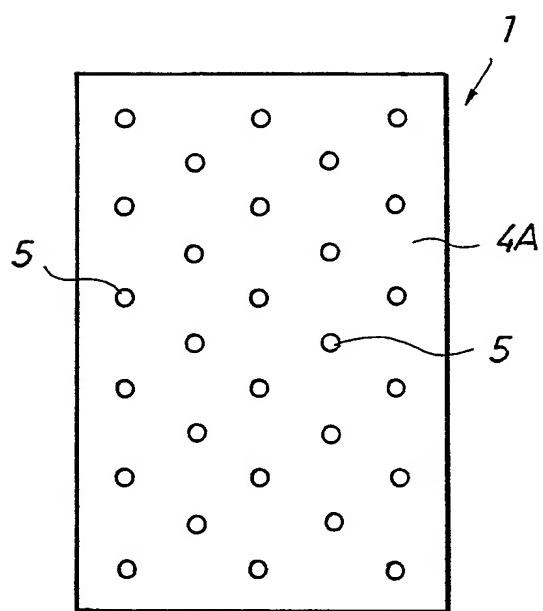
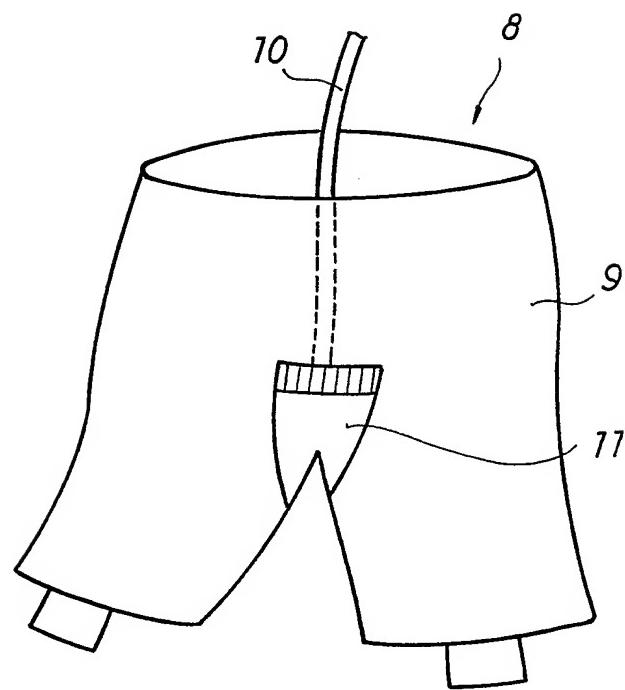


FIG.8



**F I G.9**

ABSORBENT ARTICLE

5       The present invention relates to absorbent articles for bodily fluids, such as sanitary napkins, diapers, incontinence pads, surgical pads and breast pads.

10      Absorbent articles, such as sanitary napkins and diapers, usually comprise an absorbent element for absorbing fluids, such as blood or urine, an inner permeable sheet covering the surface of the absorbent element, which is to be brought into contact with the skin, and an outer impermeable sheet covering the other surface of the absorbent element so as to prevent fluid leakage.

15      Liquid absorbency and permeability are required of the inner sheet so that it can rapidly transfer a fluid, such as blood or urine, to the absorbent element to let the element absorb it. On the other hand, the absorbent element must be able to rapidly receive the fluid from the inner sheet and to retain it.

20      The fluid cannot be transferred from the inner sheet to the absorbent element unless they are in intimate contact with each other. When they are not very close to each other, the transfer of the fluid from the inner sheet to the absorbent element is seriously impaired and the fluid is diffused or flows over the inner sheet thereby causing the leakage.

25      The phenomenon of inadequate absorption caused by the separation of the inner sheet from the absorbent element is particularly serious when the outer sheet is of unabsorbent film type, such as perforated film or net. In this case, the separation of the inner sheet from the absorbent element is fatal to the function of the absorbent article.

Various techniques have been proposed for preventing the separation of the absorbent element from the inner sheet, particularly when the latter is of film type.

Japanese Laid-Open Patent Specifications Nos. 5 1339/1982 and 259261/1985 disclose absorbent articles in which the surface sheet is integrated with a fluid-absorbent fibrous material by means of a pressure-sensitive adhesive so that the fluid is smoothly transferred from the surface sheet to the absorbent 10 element and also the surface sheet is integrated with the absorbent element.

Although the disadvantages caused by the fact that the porous film per se is not absorbent can be overcome by the above-described known process, this process has 15 the disadvantage that since the absorbent element is not a simple sheet of material but is composed of a plurality of separate fibre filaments attached to the surface sheet, only some of the fibres united with the outer sheet are easily peeled away from the absorbent element and thus the outer sheet and the absorbent element do not 20 have a truly integral structure. In addition, the fibres partially adhering to the outer sheet accelerate the undesirable retention and diffusion of the fluid over the inner sheet thereby causing the leakage.

25 It is thus an object of the present invention to provide an absorbent article which has excellent fluid-absorbing properties and is capable of preventing absorbed fluid from leaking.

According to the present invention an absorbent 30 article comprises a liquid-permeable inner sheet, a liquid-impermeable outer sheet and an absorbent element interposed between them, the inner sheet being partially adhered to the absorbent element by an adhesive, the adhesive occupying 70% or less of the area of the inner

sheet and having a 180° peel adhesion (determined by a method in accordance with JIS C 2107) of 4000 g or less.

5 Further features and details of the invention will be apparent from the following description of certain specific embodiments which is given with reference to the accompanying drawings, in which:-

Figure 1 is a cross-sectional view of the first embodiment of absorbent article in accordance with the present invention;

10 Figure 2 is a cross-sectional view of a second embodiment of the invention;

Figure 3 is a cross-sectional view of a third embodiment of the invention;

15 Figure 4 is a cross-sectional view of a fourth embodiment of the invention;

Figures 5 to 8 are diagrammatic views of different patterns in which the adhesive may be applied to the inner sheet; and

20 Figure 9 is a perspective view of a model of a female waist used in the tests which were conducted.

The absorbent article 1 shown in Figure 1 comprises a liquid-permeable inner sheet 2, a liquid-impermeable outer sheet 3 and an absorbent element 4 interposed between them. The inner sheet 2 is adhered over a proportion of its area to the absorbent element 4 by means of an adhesive 5, which may be pressure-sensitive. In accordance with the invention the adhesive 5 occupies 70% or less of the area of the inner sheet 2 and has a 180°C peel adhesion, measured in accordance with the method of the JIS C 2107 test, of 4000 g or less.

30 The JIS (Japanese Industrial Standard) C 2107 test method is a method employed for determining the adhesive power of an adhesive, in which the adhesive is applied in a width of 25 mm to PET film and the film thus treated is

pressed with a stainless steel plate and a rubber roller and the 180° peel strength is measured.

The adhesive 5 is applied to only a part of the area of the inner sheet 2 since as the proportion of the area occupied by the adhesive 5 is increased, the liquid-absorbing area is reduced thus making the absorptivity insufficient. In order not to unduly inhibit the absorbent properties of the absorbent article, the proportion of the area occupied by the adhesive must be 10 70% or less, preferably 5 to 50%.

As regards the strength of the adhesive, the 180° peel strength determined by the JIS C 2107 test method is 4000 g or less, preferably 1000 to 3000 g. If it is 4000 g or less, the outer sheet 2 adhered to the 15 absorbent element 4 is periodically released during use (if it is variously and repeatedly deformed) when in the wet state but, on the other hand, if it is more than 4000 g, the sheet 2 is not released.

It is preferred that at least that surface of the 20 absorbent element 4 which, in use, is closest to the user's skin is constituted by an absorbent sheet 4A. It is further desirable that at least the surface, which is closest to the user's skin, of the absorbent sheet 4A is connected to the central absorbent core 4B of the 25 absorbent element by embossing or by means of an adhesive, as shown in Figure 4.

This is because when the surface of the absorbent element to be adhered to the inner sheet 2 is not 30 constituted by the absorbent sheet 4A, the central absorbent core 4B will be separated from the outer sheet 2 during use, thereby unfavourably retaining bodily fluid near the inner sheet 2. On the other hand, when the inner sheet 2 is adhered to the absorbent sheet 4A of the absorbent element 4 and has a strength greater than the

adhesive strength in the wet state, the result is as follows:- the inner sheet 2 is sufficiently adhered to the absorbent element 4 to form passages for smoothly leading the bodily fluid to the absorbent element 4 before the absorbent article 1 has absorbed sufficient fluid to become wet and, once wetted, the outer sheet 2 peels away from the absorbent element 4 as a result of deformation caused by stresses applied to the absorbent element during use, thus preventing fluid from being retained at the surface thereby producing a feeling of dryness.

It is highly desirable for further improving the dryness achieved at the surface that the adhered absorbent sheet 4A be completely separated from the inner sheet 2 without breakage when it is wetted.

After intensive investigations, it has been found that the absorbent sheet 4A should desirably have a wet strength of at least 50 g, preferably 60 to 200 g, in order to further enhance the dryness in this manner.

The liquid permeable inner sheet 2 may comprise a variety of materials including those used as the inner sheet of known absorbent articles, such as nonwoven fabrics produced by either the dry or the wet method, porous films and nets. The effect of the present invention is particularly marked when the sheet 2 comprises a porous film or net which is not liquid-absorbent per se.

The absorbent element 4 may also comprise a wide variety of materials including those known for this purpose, such as absorbent paper, pulp or super absorbent polymer.

As regards the adhesives 5 which are used in the present invention, these have an adhesive strength, measured in accordance with the test of JIS C 2107, of

4000 g or less and they lose this strength under wet conditions. Such adhesives which are usable in the present invention include acrylic ester polymers, vinyl acetate/acrylic ester copolymers, ethylene/olefin copolymers, petroleum adhesive resins and ethylene/butadiene copolymers. In particular, the adhesive may be any of those sold under the Trade Names Topco P-618B (a product of Toyo-Petrolite Co., Ltd.), MQ-916 (a product of Kanebo-NSC Ltd.) and Nittite HT400ZB (a product of Nitta Gelatin Inc.). The adhesive is of course not limited to those mentioned above and any adhesive having the above-described adhesive properties can be used.

The method of application of the adhesive is not particularly important and any ordinary application method such as spraying or gravure coating can be employed. The quantity of the adhesive to be applied varies in dependence on the method of application. For example, when the aforementioned Topco P-618B is applied in a spiral form, as shown in Figure 5, the optimum quantity is 1 to 50 g/m<sup>2</sup>.

In the absorbent article according to the present invention, the inner sheet 2 and the absorbent element 4 are connected together to form a single unit by the adhesive 5 before the absorbent article 1 has absorbed fluid and become wet. However, the adhesion of the inner sheet 2 to the absorbent element 4 is lost and the inner sheet 2 separates from the absorbent element 4 to block the fluid diffusion between them once the absorbent article has absorbed fluid and the inner sheet 2 and the absorbent element 4 have been wetted to form passages for smoothly transferring the fluid from the inner sheet 2 into the absorbent element 4.

The following preferred Examples will further illustrate the present invention.

Example 1

The inner sheet 2 was a perforated polyethylene film having a base weight of 30 g/m<sup>2</sup>. The absorbent core 4B of the absorbent element 4 was prepared by spraying 0.3 g of a super absorptive polymer over a pulp having a base weight of 260 g/m<sup>2</sup>. This was then covered with an absorbent sheet 4A of paper comprising 100% pulp and having a base weight of 20 g/m<sup>2</sup> and wet strength of 80 g. The core 4B and sheet 4A were then compressed together into a single unit by embossing. The outer sheet 3 was a polyethylene sheet having a base weight of 23 g/m<sup>2</sup>, a length of 200 mm and a width of 70 mm, as shown in Figure 1. The adhesive 5 used for adhering the inner sheet 2 to the absorbent sheet 4A was Topco P-618B with an adhesive strength of 3010 g. It was sprayed in a base weight of 10 g/m<sup>2</sup> in the spiral form shown in Figure 5 and compressed to effect adhesion to produce an absorbent article in accordance with the present invention.

Example 2

The procedure of Example 1 was repeated except that a nonwoven fabric comprising a polyethylene/polyester conjugate fibre having a base weight of 20 g was used in place of the porous film as the inner sheet 2 and MQ-916 (a product of Kanebo-NSL Ltd.) with an adhesive strength of 2850 g was used as the adhesive 5 to form the structure shown in Figure 5.

Example 3

The procedure of Example 1 was repeated except that TCF 703 (a product of Futamura Chemical Industries Co., Ltd.) with a wet strength of 320 g was used as the absorbent sheet 4A, that the pulp used as the absorbent core 4B was replaced with 0.5 g of a super absorptive polymer interposed between two sheets of rayon paper comprising rayon pulp (70/30) and having a base weight of

25 g/m<sup>2</sup> and that the adhesion between the inner sheet 2 and the absorbent sheet 4A, shown in Figure 4, and between the absorbent sheet 4A and the absorbent core 4B was effected by applying 5 g/m<sup>2</sup> of Topco P-618B (a product of Toyo-Petrolite Co., Ltd.), with an adhesive strength of 3010 g in the lattice pattern shown in Figure 6 and then compressing them together to adhere the layers to one another.

5           Comparative Example 1

10          The procedure of Example 1 was repeated but the inner sheet 2 was not adhered to the absorbent sheet 4A.

15          Comparative Example 2

15          The procedure of Example 1 was repeated but the absorbent sheet 4A was replaced with a sheet of absorbent paper having a wet strength of 20 g and the adhesive used for adhering the inner sheet 2 to the absorbent sheet 4A was replaced with 10 g/m<sup>2</sup> of an acrylic adhesive (Movinyl 810 manufactured by Hoechst Japan Ltd.).

20          The products obtained in the Examples and Comparative Examples were subjected to four different tests. The results are given in the following Table.

	Adhesive strength of the adhesive (g)	Wet strength of absorbent sheet 4A (g)	Absorption characteristics		
			(1) dynamic absorption	(2) surface liquid spread	(3) surface dryness
Example	1 3010	80	13	○ ~ Δ	○
	2 2850	80	10	○	○ ~ Δ
	3 3010	300	11	○	○
Comparative Example	1 -	80	6	x	x
	2 base broken on peeling	20	6	Δ ~ x	Δ ~ x

○ : scarcely any liquid remained on the inner sheet, resulting in a dry feeling.

Δ : a small quantity of the liquid remained on the inner sheet.

x : a large quantity of the liquid remained on the inner sheet, resulting in a wet or sticky feeling.

## (4) Determination of the wet adhesive strength:

5 A sample comprising an inner sheet and an absorbent sheet adhered to each other was cut into pieces having a size of 25 mm (width) x 70 mm (length) and dipped in a water bath for about 1 min. Then the test pieces were interposed between two sheets of filter paper to remove all the excess water to produce the test samples. The test samples were then subjected to the 180° peel test with a Tensilon tensile tester under conditions in which 10 the chuck spacing was 30 m/m (20 mm of a longitudinal end of the sample being peeled off and then the surface sheet and absorbent sheet being fixed with chucks) and the pulling rate was 300 mm/min. The wet adhesive strength is given in terms of the peel strength thus determined.

15 It is apparent from the results given in the Table 1 that the absorbent articles of the Examples of the present invention were superior to those of the Comparative Examples with respect to the dynamic absorption, surface spread and dryness. Thus absorbent 20 articles according to the present invention have excellent liquid absorption as well as excellent leak inhibition properties and surface dryness.

The present invention is not limited to the above Examples and various modifications may be made.

25 For example, as shown in Figure 2, the outer sheet 3 need not extend over the edges of the absorbent element 4, as in Figure 1, but may extend only over the outer surface of the absorbent element.

30 The application pattern of the adhesive is not limited to the spiral form shown in Figure 5 but can also be of lattice form, as shown in Figure 6, in linear form, as shown in Figure 7, or in dot form, as shown in Figure 8 whilst still obtaining results equivalent to those obtained with the pattern shown in Figure 5.

The absorbent element need have no absorbent sheet 4A and the absorbent article may comprise only the absorbent core 4B and the inner sheet will then be directly adhered to the core 4B with the adhesive 5.

CLAIMS

1. An absorbent article comprising a liquid-permeable inner sheet, a liquid-impermeable outer sheet and an absorbent element interposed between them, the inner sheet being partially adhered to the absorbent element by an adhesive, the adhesive occupying 70% or less of the area of the inner sheet and having a 180° peel adhesion (determined by a method in accordance with JIS C 2107) of 4000 g or less.
2. An article as claimed in Claim 1, in which the absorbent element comprises an absorbent core and an absorbent sheet covering at least that surface of the absorbent core which is closest to the inner sheet, the absorbent sheet being adhered to at least that surface of the absorbent core which is closest to the inner sheet by means of an adhesive or by embossing.
3. An article as claimed in Claim 2, in which the strength of the connection between the inner sheet and the absorbent sheet in the wet state is 100 g or less.
4. An absorbent article as claimed in Claim 2 or 3, in which the absorbent sheet has a wet strength of at least 50 g.
5. An absorbent article substantially as specifically herein described with reference to any one of Figures 1 to 4 of the accompanying drawings, optionally in conjunction with any one of Figures 5 to 8.

Patents Act 1977  
Examiner's report to the Comptroller under  
Section 17 (The Search Report)

-13-

Application number

9207751.0

Relevant Technical fields

(i) UK CI (Edition K ) A5R RPC RPG RPL

(ii) Int CI (Edition 5 ) A61F 13/15 13/46 13/48 13/50  
13/52

Search Examiner

MISS E M COLEMAN

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

7 AUGUST 1992

Documents considered relevant following a search in respect of claims

1-5

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2167666 A (PROCTER AND GAMBLE) Whole specification	1,2,5
X	EP 0192265 A2 (KIMBERELY-CLARK) Particularly Claim 20 and page 9 lines 5-27	1
X	US 4069822 (PROCTER AND GAMBLE) Whole specification	1

Category	Identity of document and relevant passages	Relevant to claim(s)

**Categories of documents**

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

**DERWENT-ACC-NO:** 1992-384382

**DERWENT-WEEK:** 200109

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**TITLE:** Absorbent pad for diaper etc. has liq. permeable inner and impermeable outer layers sepd. by an absorbent element which is adhered to the liq. permeable layer

**INVENTOR:** ENTA M; HAMAJIMA M ; HAMAJIMA Y ; HAMASHIMA Y ; NAKANISHI M ; RYO Y ; TANAKA M ; TODA M ; YANA Y

**PATENT-ASSIGNEE:** KAO CORP [KAOS]

**PRIORITY-DATA:** 1991JP-090826 (April 22, 1991) ,  
1992TW-103132 (April 21, 1992)

**PATENT-FAMILY:**

<b>PUB-NO</b>	<b>PUB-DATE</b>	<b>LANGUAGE</b>
GB 2255720 A	November 18, 1992	EN
JP 04322645 A	November 12, 1992	JA
GB 2255720 B	July 5, 1995	EN
TW 288972 A	October 21, 1996	ZH
JP 3129760 B2	January 31, 2001	JA

**APPLICATION-DATA:**

<b>PUB-NO</b>	<b>APPL-DESCRIPTOR</b>	<b>APPL-NO</b>	<b>APPL- DATE</b>
GB 2255720A	N/A	1992GB-007751	April 7, 1992
JP 04322645A	N/A	1991JP-090826	April 22, 1991
JP 3129760B2	N/A	1991JP-090826	April 22, 1991
GB 2255720B	N/A	1992GB-007751	April 7, 1992
TW 288972A	Previous Publ	1992TW-103132	April 21, 1992

**INT-CL-CURRENT:**

<b>TYPE</b>	<b>IPC DATE</b>
CIPP	A61F5/44 20060101
CIPS	A61F13/15 20060101
CIPS	A61F13/472 20060101
CIPS	A61F13/49 20060101
CIPS	A61F13/56 20060101

**ABSTRACTED-PUB-NO:** GB 2255720 A**BASIC-ABSTRACT:**

Absorbent article comprises a liq. permeable inner sheet e.g, perforated polyethylene film, a liq. impermeable outer sheet e.g, polyethylene film and an absorbent element interposed between these sheets. The inner sheet is partially adhered to the absorbent element by means of e.g, a pressure sensitive adhesive which occupies less than 70 per cent of the surface area of inner sheet and has a 180 degree peel adhesion value measured in accordance with the method of JIS 2107 of 4000 gramme or less.

**ADVANTAGE** - For use with sanitary napkin, diaper etc. Has excellent absorptive capacity and resists leakage.

.D

**CHOSEN-DRAWING:** Dwg.1/9

**TITLE-TERMS:** ABSORB PAD DIAPER LIQUID  
PERMEABLE INNER IMPERMEABLE  
OUTER LAYER SEPARATE ELEMENT  
ADHERE

**ADDL-INDEXING-TERMS:** PERFORATED POLYETHYLENE@

**DERWENT-CLASS:** A96 D22 F07 P32

**CPI-CODES:** A12-V03A; D09-C02; D09-C03; D09-C06;  
F04-C01; F04-E04;

**POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:**

**Key Serials:** 0231 0239 1291 2424 2436 2437  
2479 2488 2496 2513 2522 2525  
2528 2569 2629 2653 2682 2683  
2718 2725 2726 2820 3252 3253  
3255 3256 3287

**Multipunch Codes:** 04- 041 046 047 143 144 33& 35&  
431 434 435 442 443 446 466 468  
477 481 483 502 532 533 54& 540  
55& 551 56& 567 57& 575 58& 595  
597 600 609 645 664 665 688

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